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CLAIMS

1. A resistive heater comprising a resistive layer coupled to a power source, said resistive layer comprising a metallic component and one or more oxide, nitride, carbide, and/or boride derivatives of said metallic component, wherein said resistive layer has a resistivity of 0.0001 to 1.0 Ω·cm, and wherein application of current from said power supply to said resistive layer results in production of heat by said resistive layer.

2. The resistive heater of claim 1, wherein said oxide, nitride, carbide, and/or boride derivative is present in said resistive layer in an amount resulting in a resistivity of said resistive layer of 0.0001 to 1.0 Ω·cm, and wherein application of current from said power supply to said resistive layer results in production of heat by said resistive layer.

3. The resistive heater of claim 1, wherein said resistive heater is disposed on a substrate.

4. A resistive heater on a substrate, produced by the method comprising the steps of:

a) providing a substrate, a metallic component feedstock, and a gas comprising one or more of oxygen, nitrogen, carbon, and boron;

b) melting said feedstock to produce a stream of molten droplets;

c) reacting said molten droplets with said gas to produce one or more oxide, nitride, carbide, or boride derivatives of said metallic component, wherein a portion of said metallic component reacts with said gas to produce said oxide, nitride, carbide, and/or boride derivative of said metallic component and a portion of said metallic component remains unreacted;

d) depositing said unreacted metallic component and said oxide, nitride, carbide, and/or boride derivatives of said metallic component onto said substrate to produce a resistive layer; and

e) connecting said resistive layer of step (d) to a power supply to produce a resistive heater.

5. The resistive heater of claim 4, wherein said molten droplets have an average diameter of 5 to 150 μm.

6. The resistive heater of claim 4, wherein said resistive layer has a resistivity of 0.0001 to 1.0 Ω·cm.

7. The resistive heater of claim 1, further comprising an electrically insulating layer between said substrate and said resistive layer.

8. The resistive heater of claim 7, wherein said insulating layer comprises aluminum oxide or silicon dioxide.

9. The resistive heater of claim 7, further comprising an adhesion layer between said insulating layer and said substrate.

10. The resistive heater of claim 9, wherein said adhesion layer comprises nickel-chrome alloy or nickel-chrome-aluminum-yttrium alloy.

11. The resistive heater of claim 1, further comprising a heat reflective layer between said resistive layer and said substrate.

12. The resistive heater of claim 11, wherein said heat reflective layer comprises zirconium oxide.

13. The resistive heater of claim 1, further comprising a ceramic layer superficial to said resistive layer.

14. The resistive heater of claim 13, wherein said ceramic layer comprises aluminum oxide.

15. The resistive heater of claim 14, wherein said ceramic layer is sealed with nanophase aluminum oxide.

16. The resistive heater of claim 1, further comprising a metallic layer superficial to said resistive layer.

17. The resistive heater of claim 16, wherein said metallic layer comprises molybdenum or tungsten.

18. The resistive heater of claim 1, wherein said substrate is an injection mold, a roller, or a platen for semiconductor wafer processing.

19. The resistive heater of claim 1, wherein said metallic component is titanium (Ti), silicon (Si), aluminum (Al), zirconium (Zr), cobalt (Co), nickel (Ni), or alloys thereof.

20. A method of fabricating a resistive heater on a substrate, said method comprising the steps of:

a) providing a substrate, a metallic component feedstock, and a gas comprising one or more of oxygen, nitrogen, carbon, and boron;

b) melting said feedstock to produce a stream of molten droplets;

c) reacting said molten droplets with said gas to produce one or more oxide, nitride, carbide, or boride derivatives of said metallic component, wherein a portion of said metallic component reacts with said gas to produce said oxide, nitride, carbide, and/or boride derivative of said metallic component and a portion of said metallic component remains unreacted;

d) depositing said unreacted metallic component and said oxide, nitride, carbide, and/or boride derivative of said metallic component onto said substrate to produce a resistive layer; and

e) connecting said resistive layer of step (d) to a power supply to produce a resistive heater.

21. The method of claim 20, wherein said melting step (b) and said reacting step (c) are coordinated such that the resistive layer of step (d) has a resistivity of 0.0001 to 1.0 Ω·cm.

22. The method of claim 20, wherein said molten droplets of step (b) have an average diameter 5 to 150 μm.

23. The method of claim 20, wherein said resistive layer of step (d) has a resistivity of 0.0001 to 1.0 Ω·cm.

24. The method of claim 20, wherein said substrate comprises an electrically insulating layer.

25. The method of claim 20, wherein said substrate comprises an adhesion layer.

26. The method of claim 20, wherein said substrate comprises a heat reflective layer.

27. The method of claim 20, further comprising step (f) applying a ceramic layer superficial to said resistive layer, wherein step (f) is performed before, during, or after step (e).

28. The method of claim 27, further comprising step (g) applying a metallic layer superficial to said ceramic layer, wherein step (g) is performed before, during, or after step (e).

29. The method of claim 20, wherein said substrate is an injection mold, a roller, or a platen for semiconductor wafer processing.

30. The method of claim 20, wherein said metallic component is titanium (Ti), silicon (Si), aluminum (Al), or zirconium (Zr), cobalt (Co), nickel (Ni), or alloys thereof.

31. An injection mold comprising a mold cavity surface and a coating comprising a resistive layer, said coating being disposed on at least a portion of said surface, said resistive layer comprising a metallic component and one or more oxide, nitride, carbide, and/or boride derivatives of said metallic component, wherein said resistive layer has a resistivity of 0.0001 to 1.0 Ω·cm, and wherein

application of current from a power supply to said resistive layer results in production of heat by said resistive layer.

32. The injection mold of claim 31, wherein said oxide, nitride, carbide, and/or boride derivative of said metallic component is present in said resistive layer in an amount resulting in a resistivity of said resistive layer of 0.0001 to 1.0 $\Omega \cdot$cm, said resistive layer being coupled to a power supply, and wherein application of current from said power supply to said resistive layer results in production of heat by said resistive layer.

33. The injection mold of claim 31, wherein said coating further comprises an electrically insulating layer between said cavity surface and said resistive layer.

34. The injection mold of claim 33, wherein said coating further comprises an adhesion layer between said cavity surface and said insulating layer.

35. The injection mold of claim 31, wherein said coating further comprises a heat reflective layer between said resistive layer and said substrate.

36. The injection mold of claim 31, wherein said coating further comprises a ceramic layer superficial to said resistive layer.

37. The injection mold of claim 31, wherein said coating further comprises a metallic layer superficial to said resistive layer.

38. The injection mold of claim 31, further comprising a runner, wherein said coating is disposed on at least a portion of a surface of said runner.

39. A method of making a molded product, said method comprising the steps of:

a) providing an injection mold comprising a cavity surface and a coating comprising a resistive heater coupled to a power supply, said coating disposed on at least a portion of said cavity surface, wherein said resistive heater comprises a metallic component and one or more oxide, nitride, carbide, and/or boride derivatives of said metallic component, wherein said resistive heater has a resistivity of 0.0001 to 1.0 $\Omega \cdot$cm, whereby application of current from said power supply to said resistive layer results in production of heat by said resistive layer;

b) heating said resistive heater;

c) injecting a thermoplastic or metal melt into said mold, wherein said heated resistive heater regulates solidification of said melt; and

d) cooling said melt in said mold to form said molded product.

40. The method of claim 39, wherein said resistive heater is produced by a method comprising the steps of:

a) providing a metallic component feedstock and a gas comprising one or more of oxygen, nitrogen, carbon, and boron;

b) melting said feedstock to produce a stream of molten droplets;

c) reacting said molten droplets with said gas to produce one or more oxide, nitride, carbide, or boride derivatives of said metallic component, wherein a portion of said metallic component reacts with said gas to produce said oxide, nitride, carbide, and/or boride derivatives of said metallic component, and a portion of said metallic component remains unreacted;

d) depositing said metallic component and said oxide, nitride, carbide, and/or boride derivatives of said metallic component to produce a resistive layer; and

e) connecting said resistive layer of step (d) to a power supply to produce said resistive heater.

41. The method of claim 39, wherein said injection mold further comprises a runner, wherein said coating is disposed on at least a portion of a surface of said runner.

42. The method of claim 39, wherein said coating further comprises an electrically insulating layer between said cavity surface and said resistive heater.

43. The method of claim 42, wherein said coating further comprises an adhesion layer between said cavity surface and said insulating layer.

44. The method of claim 39, wherein said coating further comprises a heat reflective layer between said resistive heater and said cavity surface.

45. The method of claim 39, wherein said coating further comprises a ceramic layer superficial to said resistive layer.

46. The method of claim 39, wherein said coating further comprises a metallic layer superficial to said resistive layer.

47. A cylindrical roller comprising an outer surface, an inner surface surrounding a hollow core, and a resistive heater comprising a resistive layer

coupled to a power source, said resistive layer comprising a metallic component and one or more oxide, nitride, carbide, and/or boride derivatives of said metallic component, wherein said resistive layer has a resistivity of 0.0001 to 1.0 Ω·cm, and wherein application of current from said power supply to said resistive layer results in production of heat by said resistive layer, wherein said resistive heater is disposed on said outer surface or said inner surface.

48. A method of drying paper during manufacturing comprising the steps of:

a) providing paper comprising a water content of greater than about 5% and one or more cylindrical rollers, each comprising an outer surface, an inner surface surrounding a hollow core, and a resistive heater comprising a resistive layer coupled to a power source, said resistive layer comprising a metallic component and one or more oxide, nitride, carbide, and/or boride derivatives of said metallic component, wherein said resistive layer has a resistivity of 0.0001 to 1.0 Ω·cm, and wherein application of current from said power supply to said resistive layer results in production of heat by said resistive layer, wherein said resistive heater is disposed on said outer surface or said inner surface;

b) heating said roller with said resistive heater; and

c) contacting said paper with said roller for a time suitable for drying said paper to a water content of less than about 5%.

49. A semiconductor wafer processing system comprising:

a) an enclosure defining a reaction chamber and comprising a platen;

b) a support structure mounted within the reaction chamber, the support structure mounting a semiconductor wafer to be processed within said chamber; and

c) a resistive heater comprising a resistive layer coupled to a power source, said resistive layer comprising a metallic component and one or more oxide, nitride, carbide, and/or boride derivatives of said metallic component, wherein said resistive layer has a resistivity of 0.0001 to 1.0 Ω·cm, wherein application of current from said power supply to said resistive layer results in production of heat by said resistive layer, and wherein said heater is disposed on said platen.

50. A method for heating a semiconductor wafer comprising the steps of:

a) providing a semiconductor wafer and a semiconductor wafer processing system comprising:

i) an enclosure defining a reaction chamber and comprising a platen;

ii) a support structure mounted within the reaction chamber, the support structure mounting a semiconductor wafer to be processed within said chamber; and

iii) a resistive heater comprising a resistive layer coupled to a power source, said resistive layer comprising a metallic component and one or more oxide, nitride, carbide, and/or boride derivatives of said metallic component, wherein said resistive layer has a resistivity of 0.0001 to 1.0 Ω·cm, wherein application of current from said power supply to said resistive layer results in production of heat by said resistive layer, and wherein said heater is disposed on said platen; and

b) heating said wafer with said resistive heater.

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